

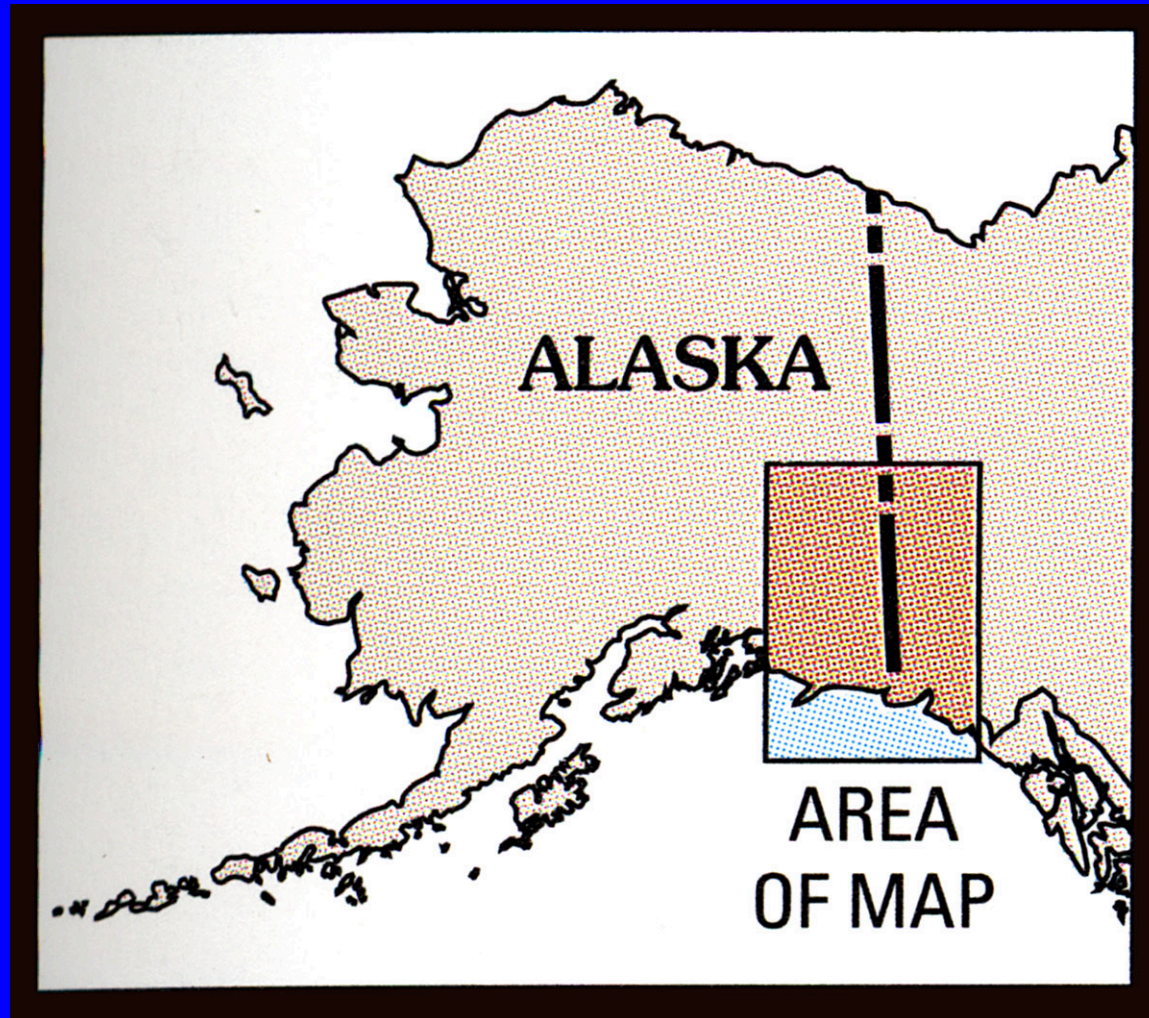
Roy Shlemon Course in Applied Watershed Science

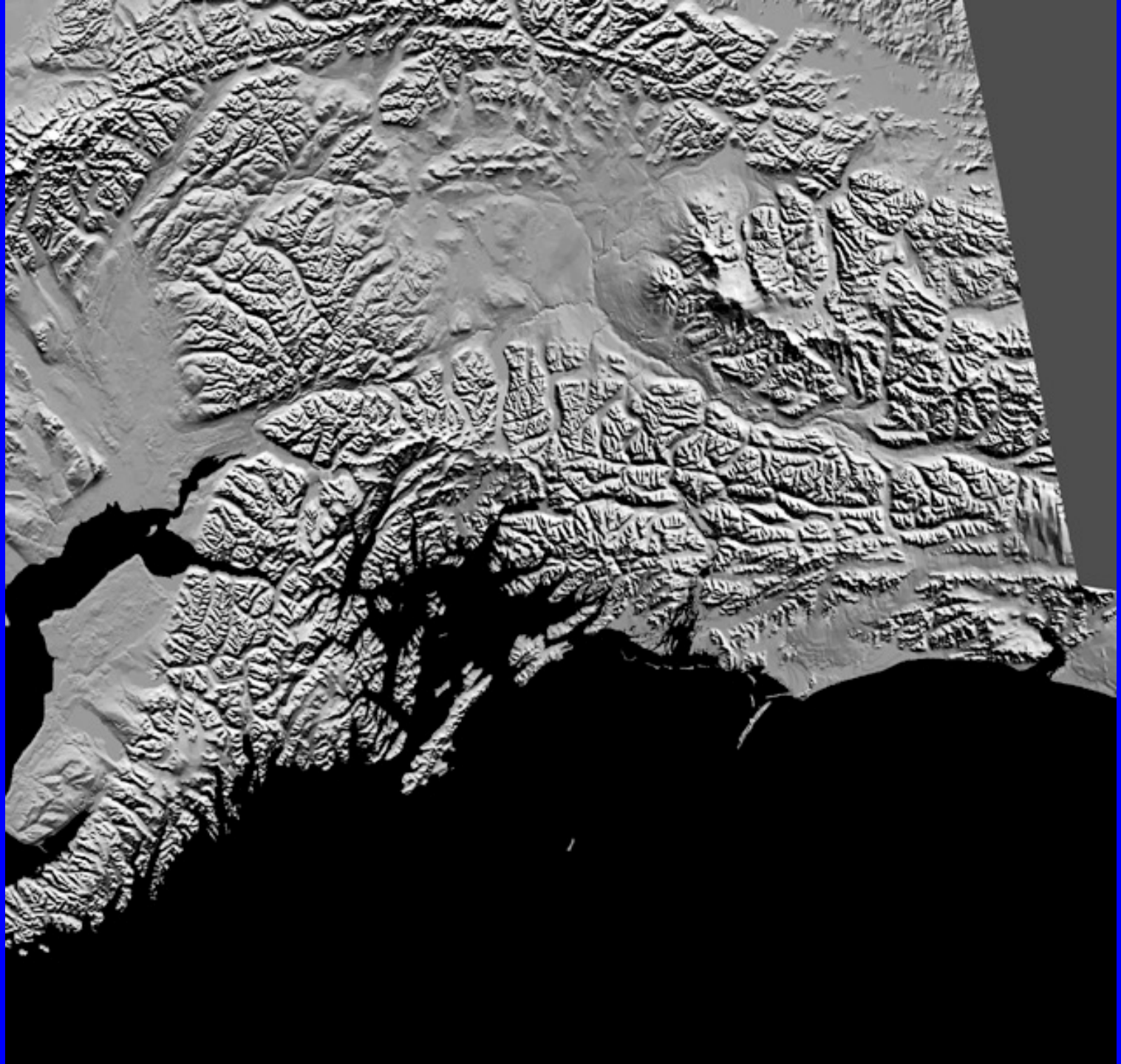
Copper River Basin
Spring/Summer 2002

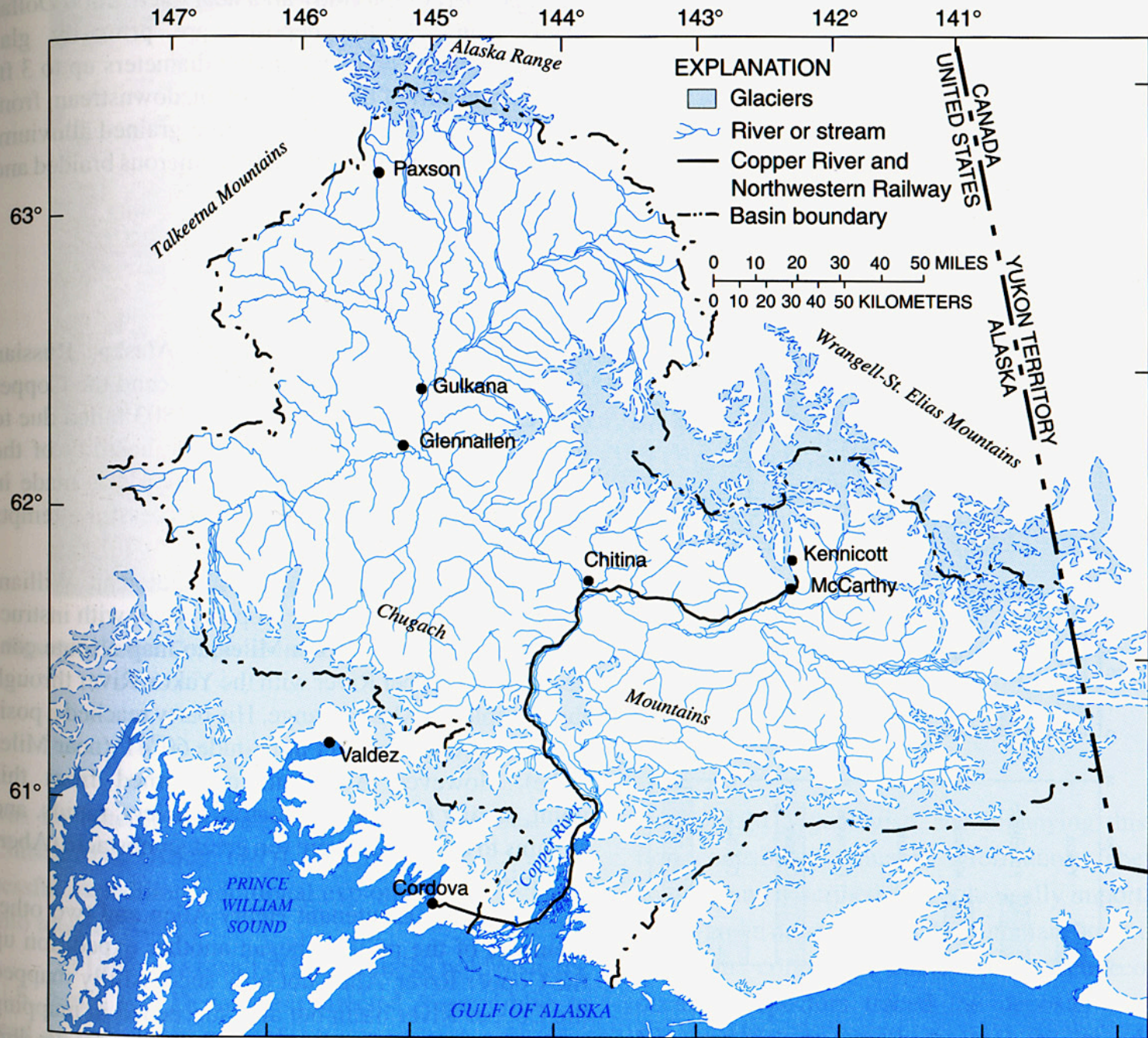
Shlemon Course Goals

- Introduction to collaborative, interdisciplinary watershed science
- Exposure to an array of disciplines and analytic techniques
- Literature and field-based discovery
- Archive the collaborative activities of the class for future reference

Copper River Basin, South-Central Alaska

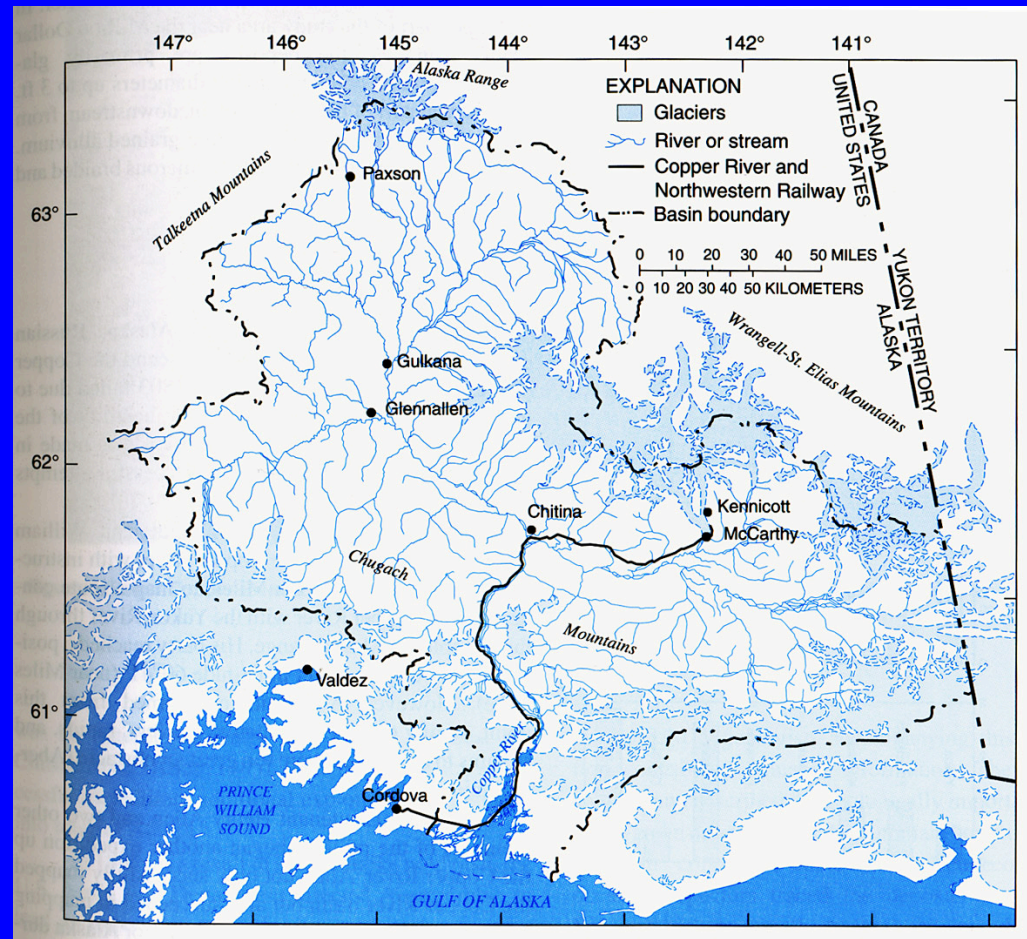






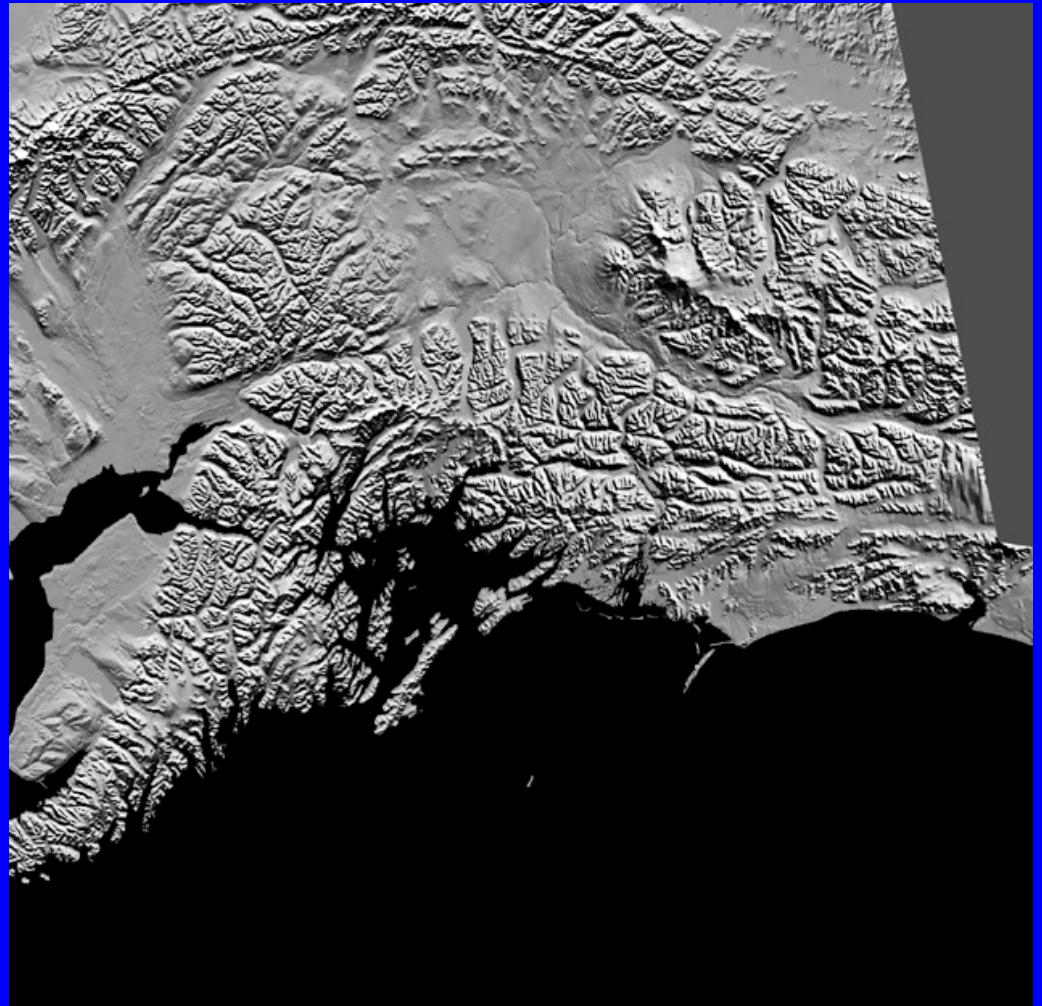
Basin Characteristics

- Bounded by Talkeetna Mountains, Alaska Range, and Wrangell-St. Elias Mountains
- Bisects the Chugach Range
- 24,200 mi²
- 290 mi. length



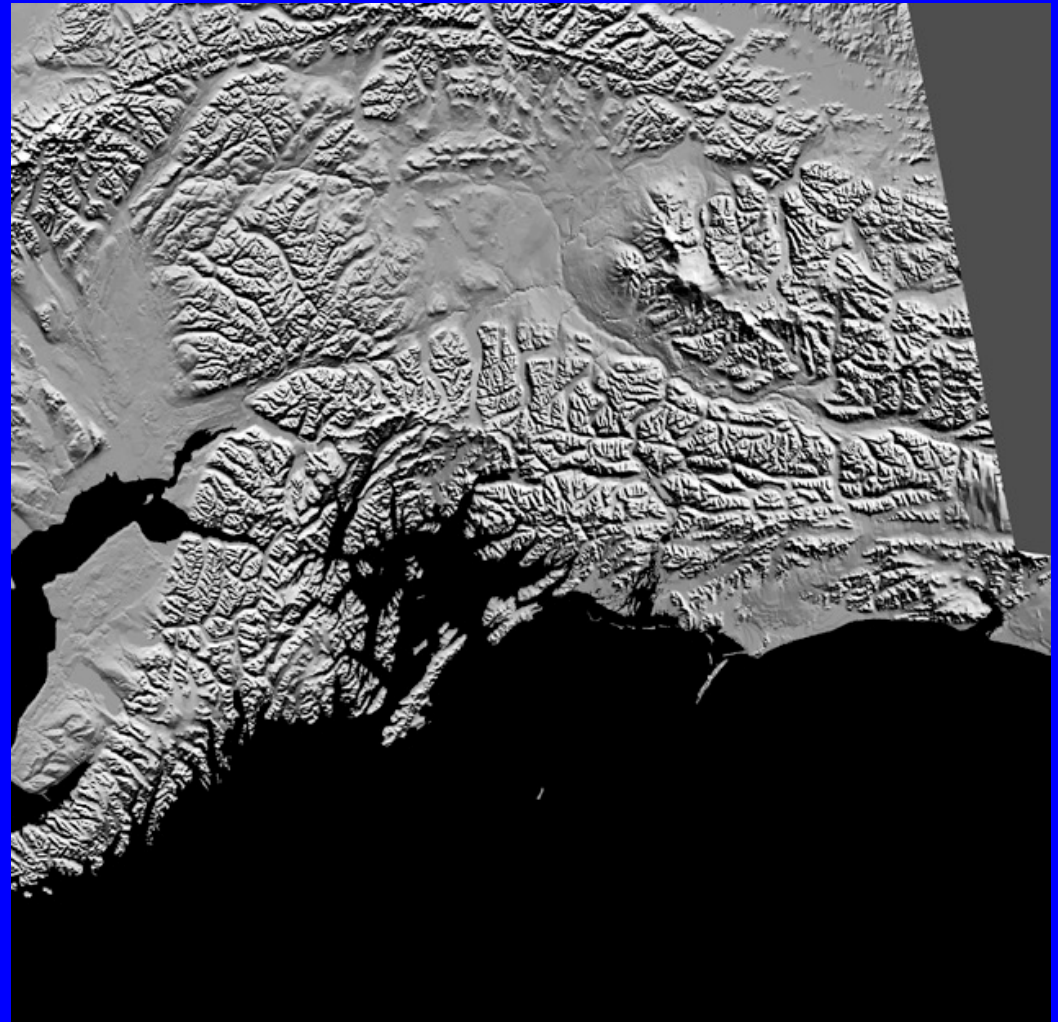
Upper Copper River

- 12,000 to 16,000 ft. peaks
- Most extensive glaciers in North America, covering 20% of basin
- Subarctic climate with intense feedback between glaciers and atmosphere



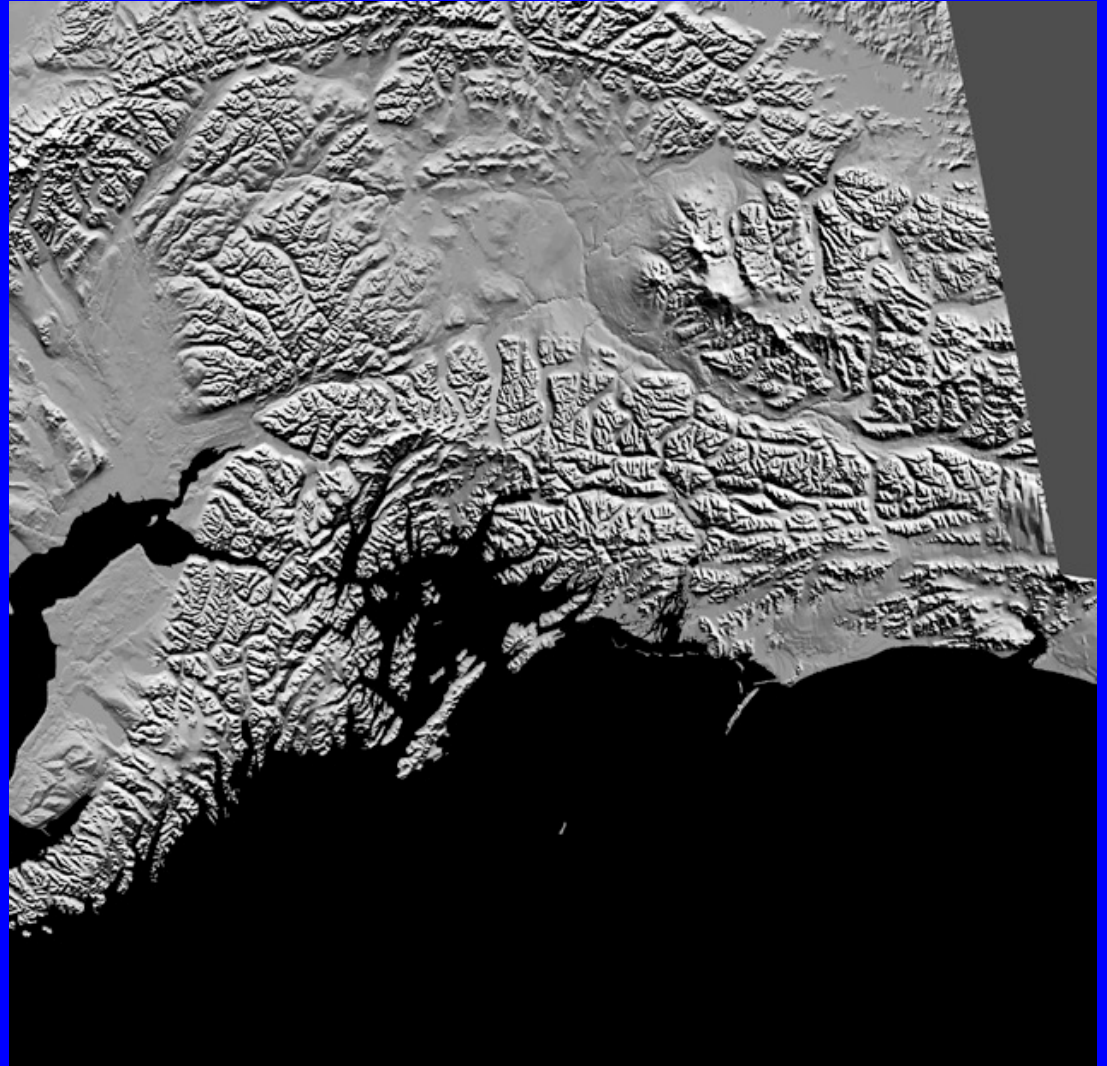
Middle Copper River

- Copper River Canyon dominated by glacial outwash
- Intermittent glacial ice dams connected Copper to Bering Sea
- Transition from maritime to polar climate



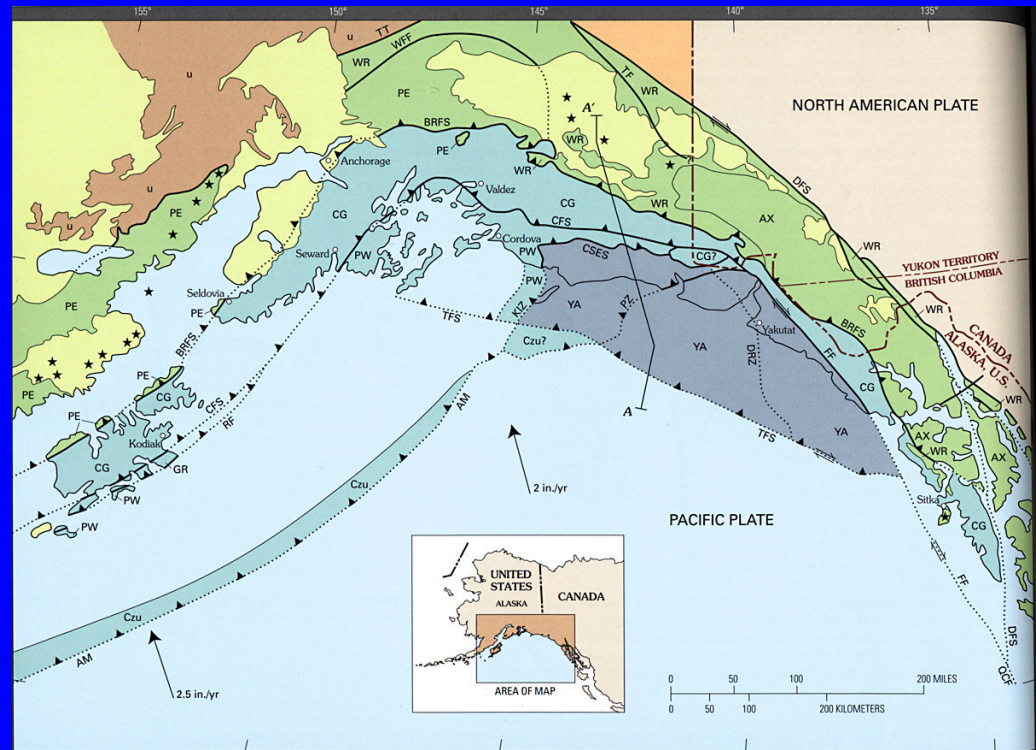
Copper River Delta

- Largest coastal wetland on Pacific Coast
- Extensive glacial outwash plain
- Frequent pulses of uplift

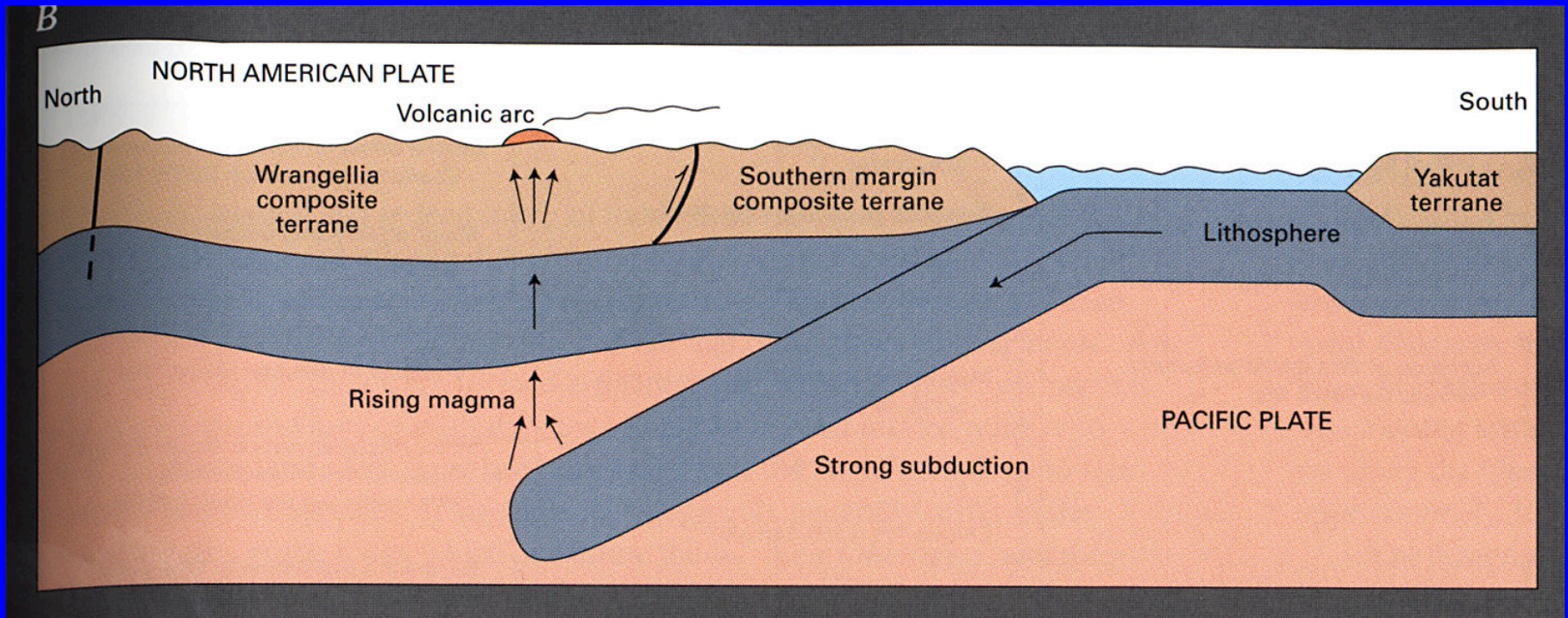


Tectonic Setting

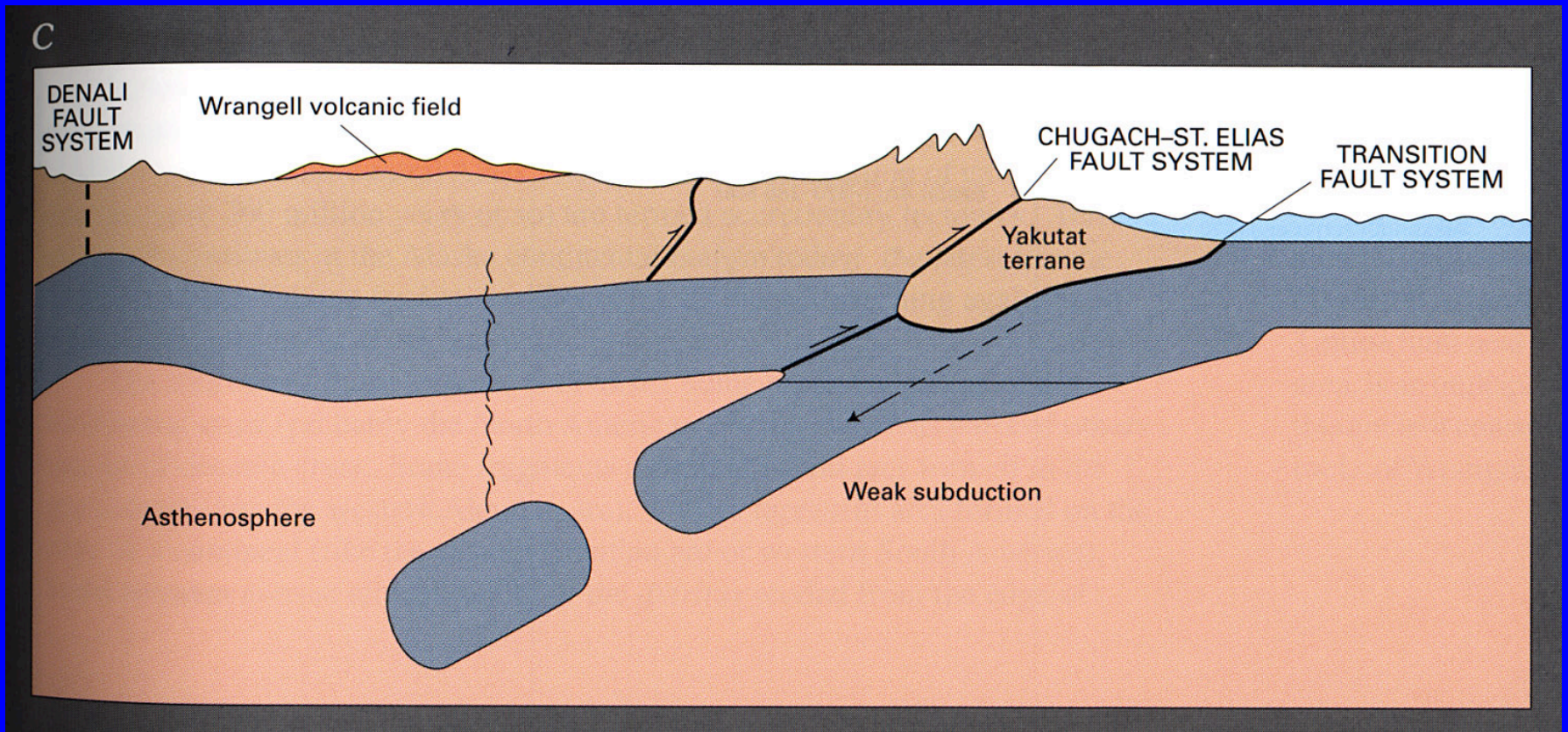
- Subduction and transform margin
- High rates of uplift in the Wrangell-St. Elias and Chugach Mountains
- High seismicity



26 m.y. ago



Present Day



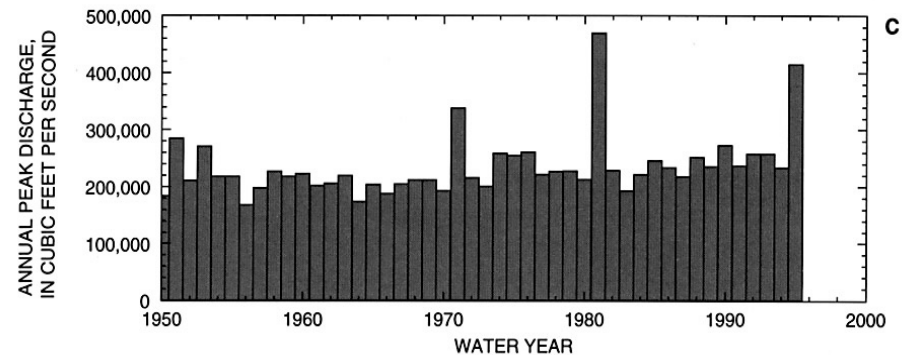
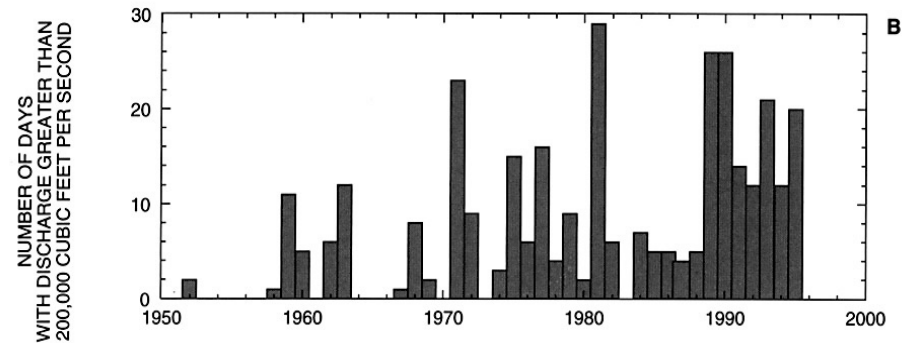
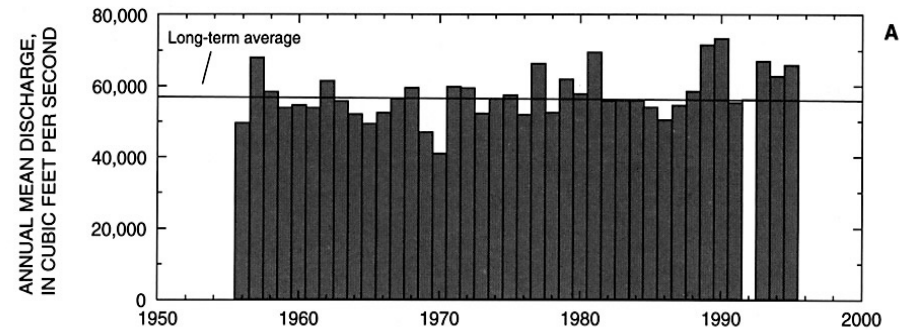


EXPLANATION

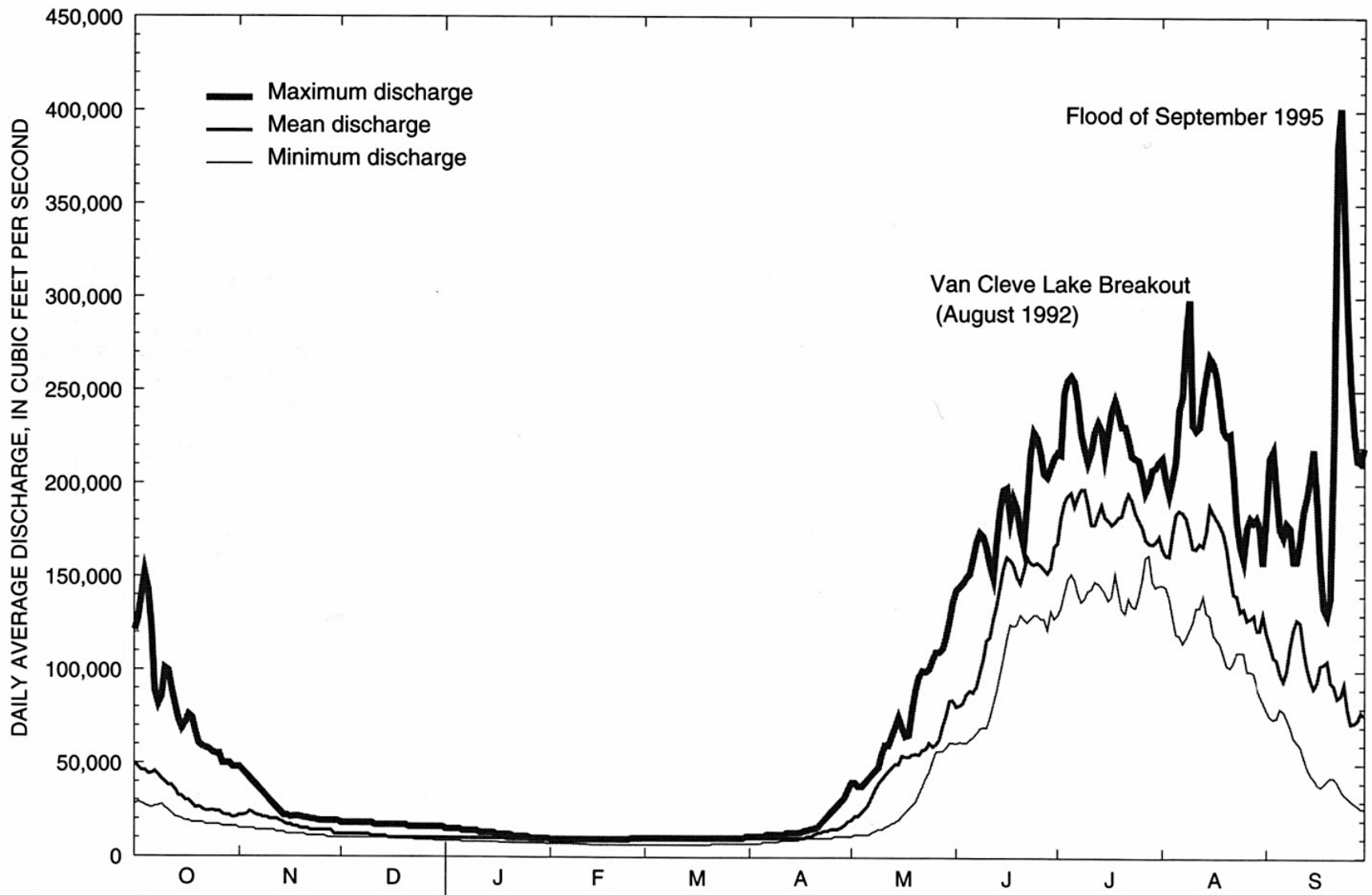
- 50 km Average depths of earthquakes in the Wrangell Benioff zone of seismicity—Contours in kilometers
- 1979 Earthquake epicenter with magnitude > 7.0—Showing year
- Volcano
- ↖ 2 in./yr Motion vector of Pacific plate relative to North American plate

Basin Hydrology

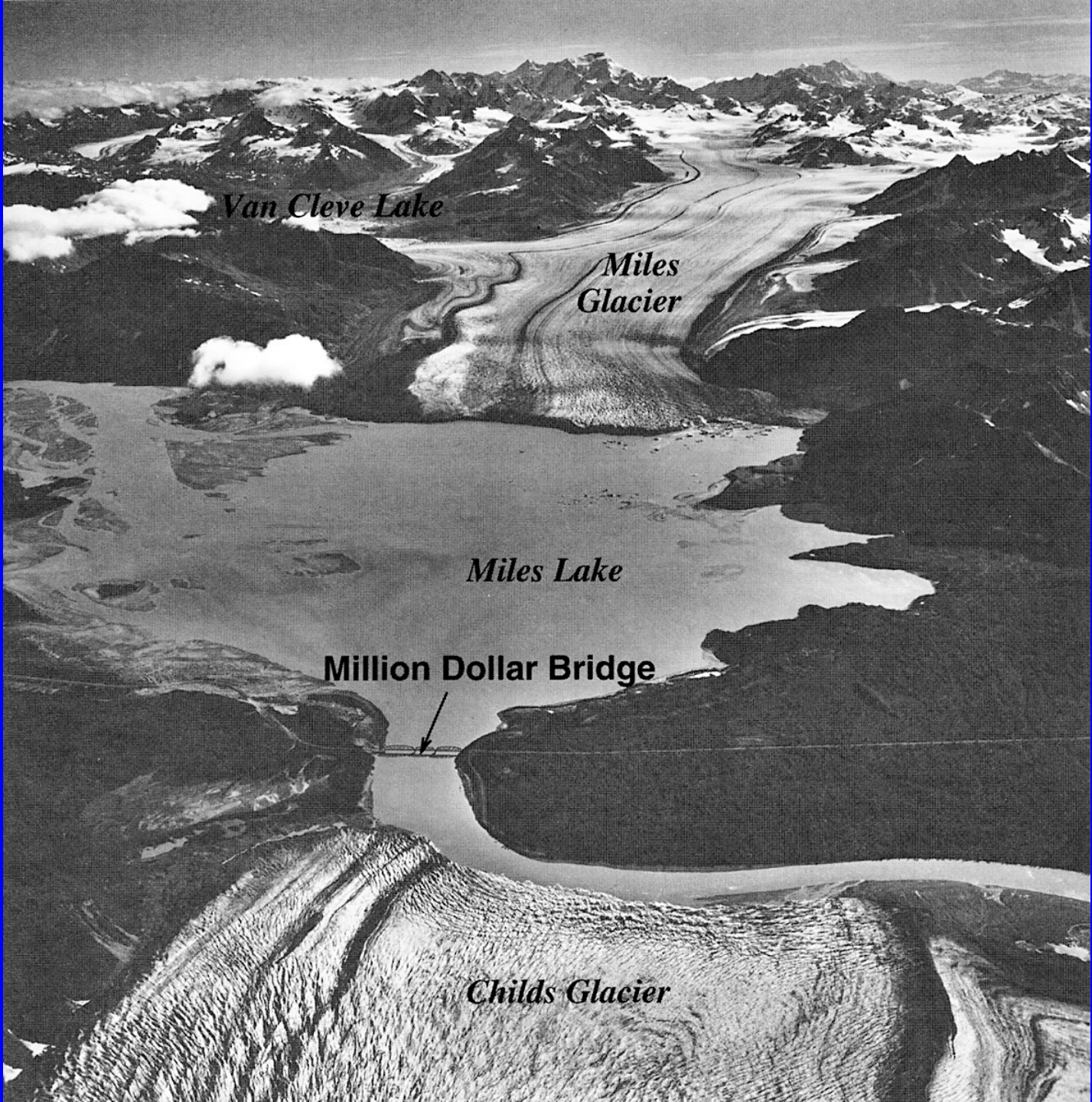
- Mean annual discharge of 58k cfs
- Peak recorded discharge of 470k cfs(1995)
- Mean annual flood of 250k



Synthesized flow statistics for the Copper River at the Million Dollar Bridge, 1950 to 1988.



Flow statistics of the Copper River at Million Dollar Bridge, 1988-95.



Van Cleve Lake

*Miles
Glacier*

Miles Lake

Million Dollar Bridge

Childs Glacier

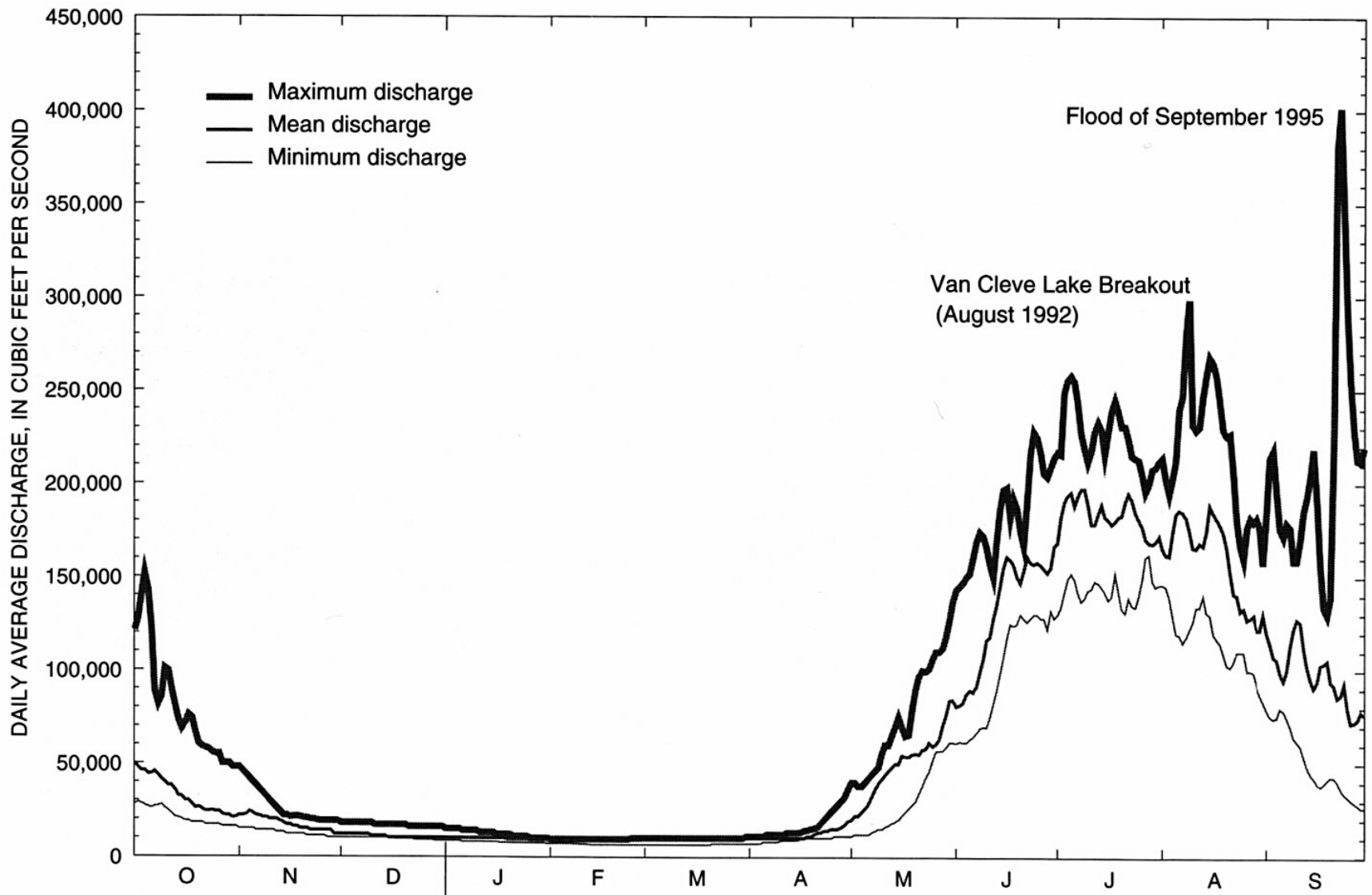
Ice Dam Breakouts



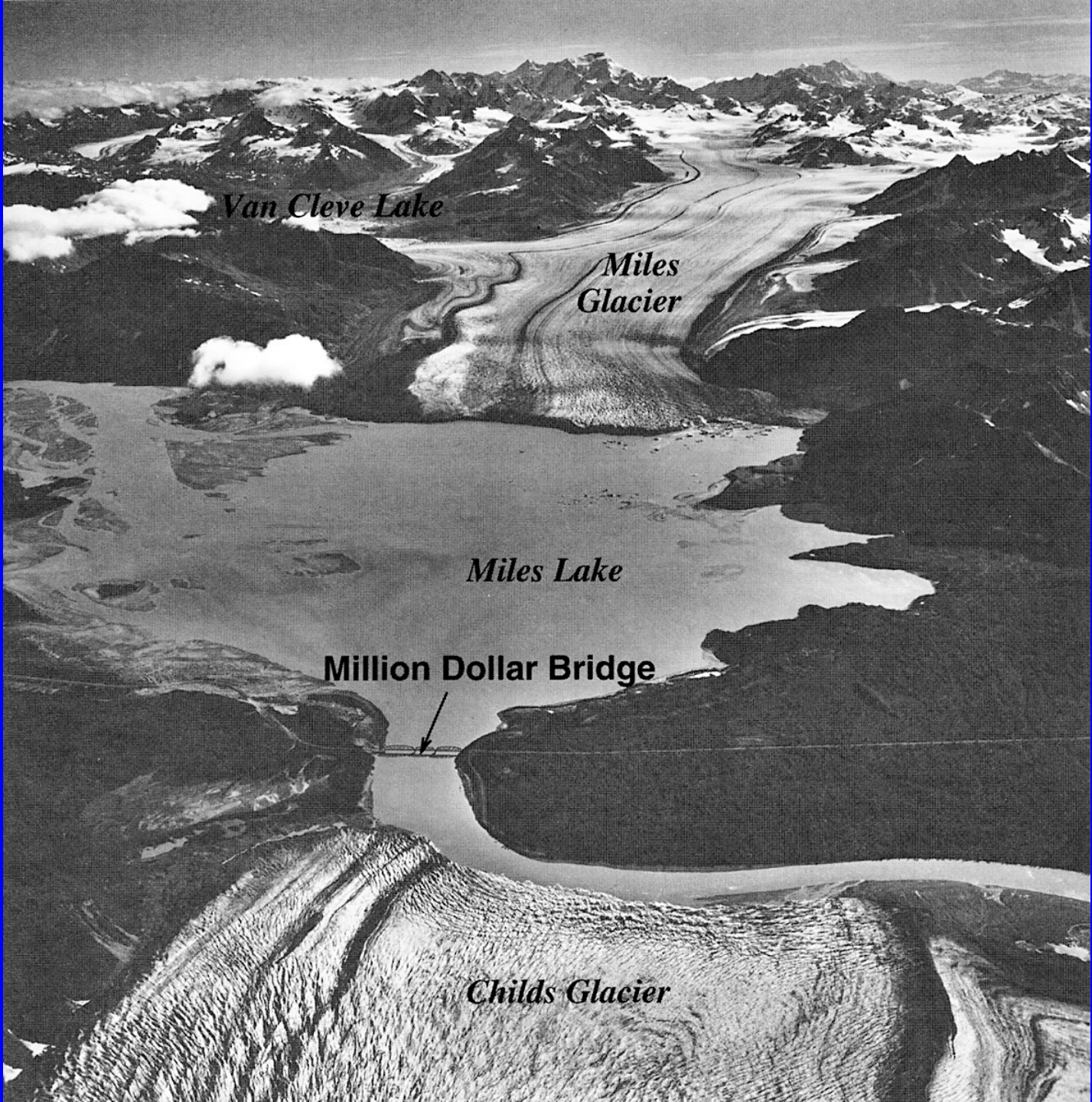
Break-outs on Van Cleve Lake occurred in 1912, 1962, 1974, and 1992



Releases exceeded 1 million acre-ft., with added discharge of 150-200k cfs



Flow statistics of the Copper River at Million Dollar Bridge, 1988-95.



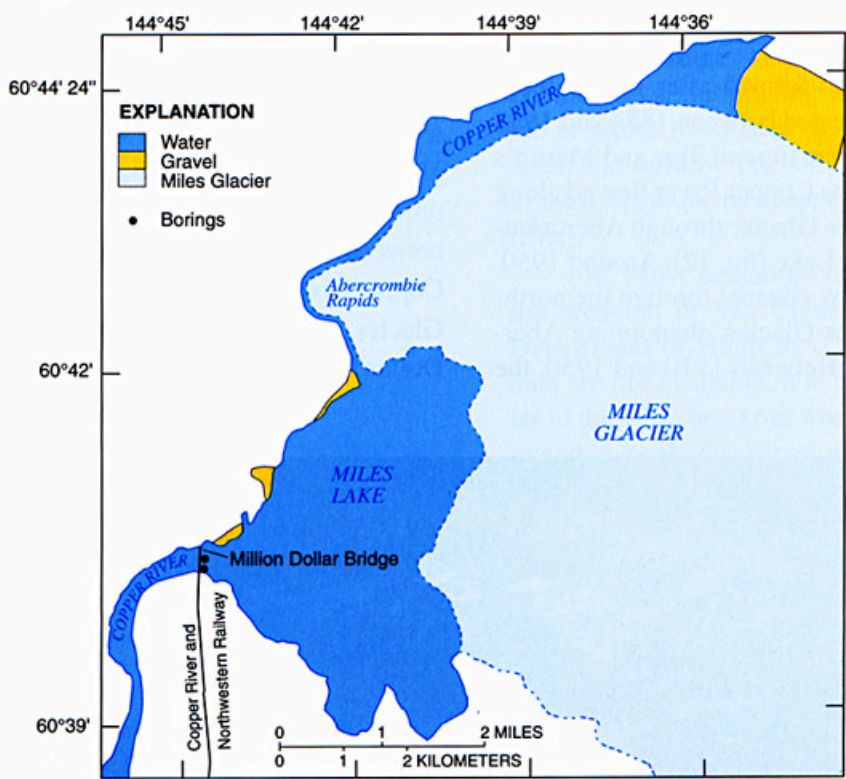
Van Cleve Lake

*Miles
Glacier*

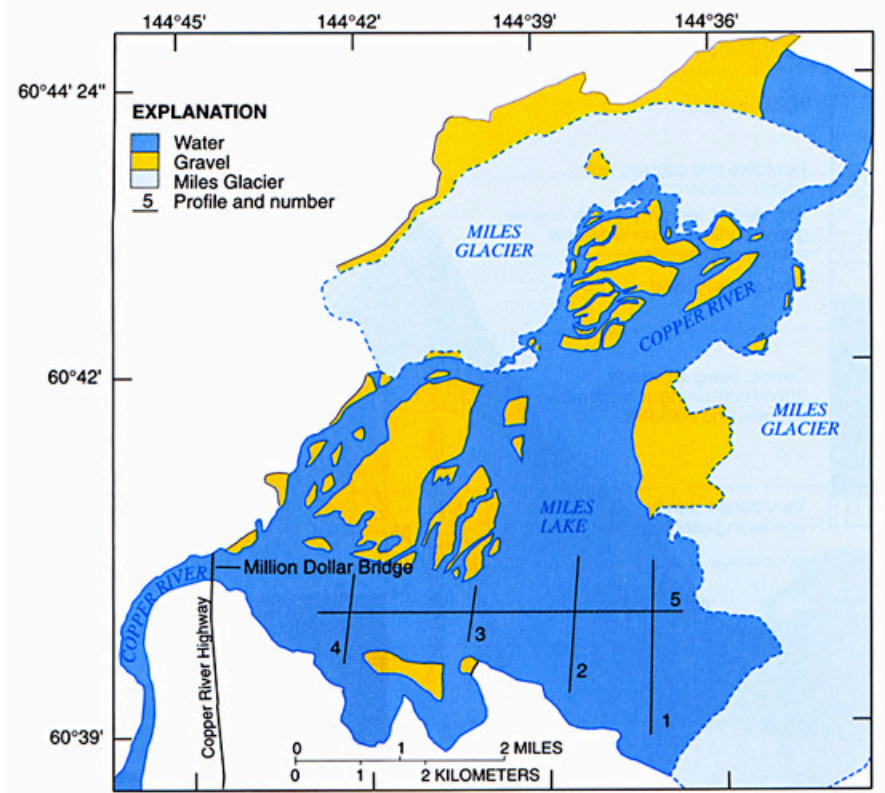
Miles Lake

Million Dollar Bridge

Childs Glacier



Location of Miles Lake and Miles Glacier, 1910.



Location of Miles Lake and Miles Glacier, 1991.

Sediment Transport

- Miles Lake acts as a bedload trap. No significant information upstream.
- Copper River Delta acts as a ss sink during low flow (<100k) and source during high flow



Sediment Loads

- Copper River has highest per-acre yield of sediment in Alaska, twice the Stikine and 10 times the Yukon.



Geomorphology

- Middle reach: coarse-grained, glacially-dominated braided river
- Lower reach: braided river and braid-delta



Vegetation

- Dominated by glacial retreat
- 75 community types, 42 successional sequences, 6 landscape types
- Common plant types include: sedge, grass-forb, upland meadow, spagnum bog, muskeg, tidal marsh, dunegrass, willow and sweetgale, sitka alder and understory plants, black cottonwood and Sitka spruce.



Birds

- 200 species of resident and migrant birds
- Copper River Delta key stopover and breeding ground for waterfowl and shorebirds
- Designated Western Shorebird Reserve Network



Wildlife

- Large mammals abundant
- Black and Brown Bear
- Moose (introduced in 1949)
- Coyote, lynx, red fox, wolverine, wolves, porcupine, beaver, squirrel



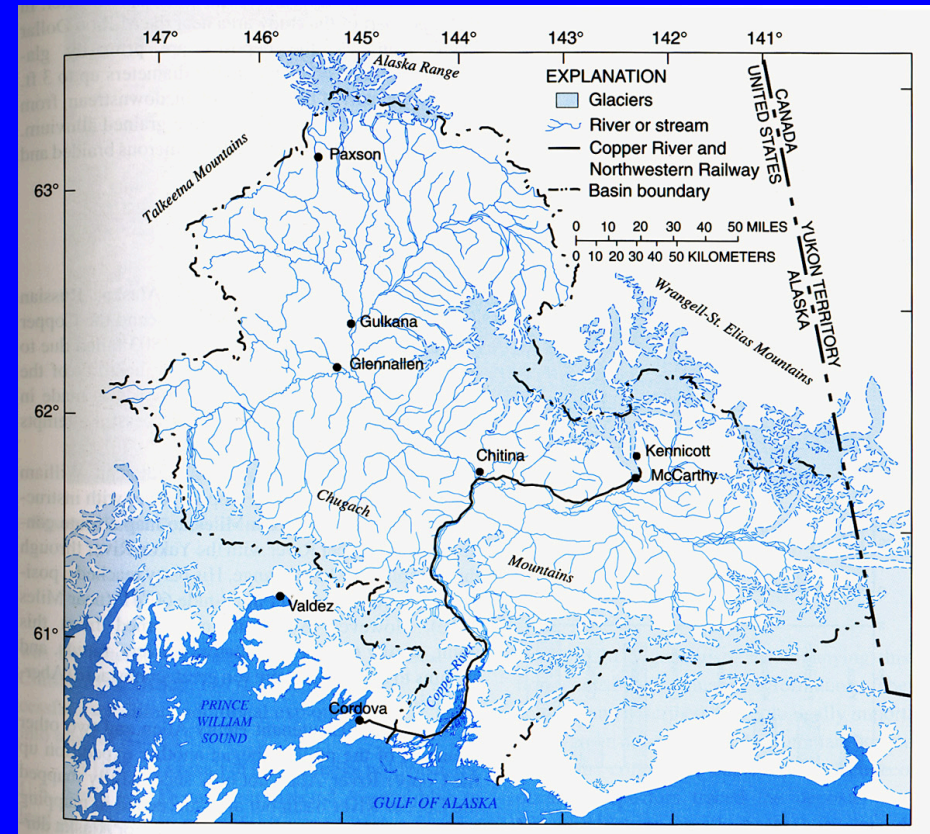
Fish

- Largest salmon fishery in central Alaska.
- Five salmon species
- 19 distinct stocks of sockeye
- Dolly Varden char, arctic grayling, hooligan, burbot, rainbow, lake and cutthroat trout
- Northernmost steelhead



Most Significant Land Use Changes

- Construction of the Copper River and Northwest Railroad between 1906 and 1911 (now Copper River Highway)
- Introduction of moose



Priorities for Research as defined by USFS Copper River Science Commission, 2000

- Organic productivity in watershed and delta
- Plant-sediment-water interactions (redox conditions)
- Plant productivity and succession
- Moose and plant productivity
- Habitat use by salmon
- Effects of climate
- Sediment and carbon budgets in watershed and delta
- Tectonic history of delta
- Glaciation and its influence on early people

Priorities for Research as defined by USFS Copper River Science Commission, 2000

- Shorebird use of delta during spring and fall migrations
- Habitat characteristics of shorebirds
- Nutrient dynamics of dusky Canada geese
- Waterfowl staging habitats in delta
- Long-term monitoring of plant community ecological structure and dynamics
- Geology and hydrology of Kennicott River Basin
- Glacial response to climate change

Priorities for Research as defined by USFS Copper River Science Commission, 2000

- Early migration routes
- Oral tradition and mythology
- Environmental effects on culture, values, perceptions and identity
- Relationship between environment and spirituality, cultural values and economic systems
- Impacts of mining, construction and fishing
- Human displacements

Course Requirements

- Sole-authored, peer-reviewed natural history report
- Oral presentation of report and proposed field research plan
- Final group field research plan
- Field report

QuickTime™ and a
Photo - JPEG decompressor
are needed to see this picture.

Field Schedule

- Meet at Anchorage
Guest House on June
26 6 p.m.
- Take Out Flag Point
July 9, shuttle to
Cordova
- Ferry and train to
Anchorage July 10

QuickTime™ and a
Photo - JPEG decompressor
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- Wrangell-St. Elias National Park
- Wrangell-St. Elias National Preserve
- Native corporation lands
- Unpaved road















